

Appendix

Channel Bandwidth

- Use existing channel allocations or acquire new spectrum
 - ★ existing allocations may limit technology choice (and thus bandwidth) and may be heavily used
 - ⊗ competition for resources
 - ★ new spectrum = new opportunities
- larger bandwidth provides scope for enhanced services, wider channel bandwidths and higher capacity
 - ★ data, video and higher voice quality
- multiple access:
 - ★ TDMA and CDMA channels improve economics for higher subscriber densities
 - ★ facilitates bandwidth flexibility
 - ★ facilitates future-proofing for new services

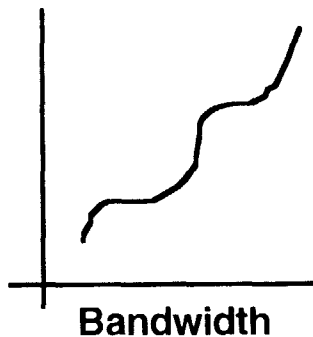
Channel Coding

coding adds additional information to assist accurate recovery of the signal under poor propagation conditions. Coding may be applied at the RF signal and/or at the signal source

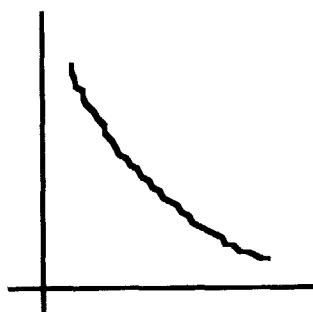
- Complex tradeoff between RF bandwidth needs, Coverage and RF Transmission Quality
- Possible secondary impacts: heavy voice compression affects delay and possibly audio quality
- Data transparency may require higher rate voice codecs OR dynamic selection of specific data/FAX modems or inter-working functions

★ For example, use of 8kb/s voice channels will preclude the transport of >8kb/s data signals without special channel processing or channel concatenation

Channel Coding



Channel Coding



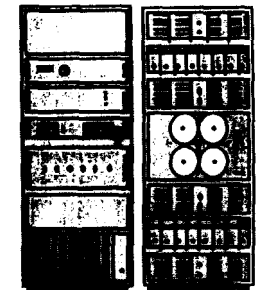
Required RF Quality

Channel Access and Duplexing

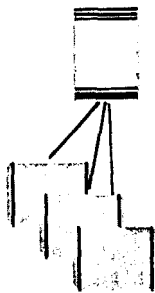
- Multiple access methods:
 - ★ choice of FDMA, TDMA or CDMA impact system design/behavior
 - ★ loosely coupled to market requirements, but no clear winner without detailed analysis
 - ⊗ most can be tuned to meet requirements, but possibly with cost impact
- Time-Division Duplexing (TDD) vs. Frequency-Division Duplexing (FDD):
 - ★ both transmit and receive share the same frequency with TDD, FDD requires two frequencies
 - ★ TDD simplifies handset and radio link management
 - ★ TDD limits reach and bandwidth in larger systems and may require tight adjacent cell synchronization

Cell Reach

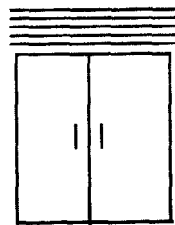
- >100m for low power, low antennas
- 50-80 km for high power, high antennas
- highly dependent on terrain and environment (urban/rural)
- Complex economic, capacity, density tradeoff
- antennas probably subject to zoning regulations
- transmit power subject to FCC regulation



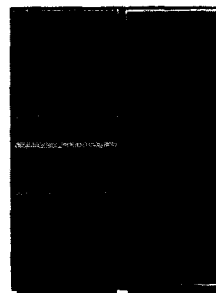
Macrocell



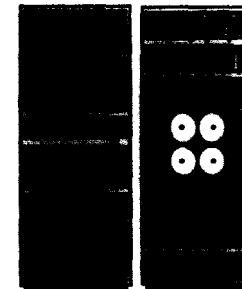
Microcell



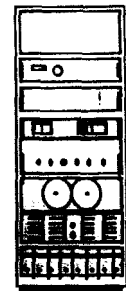
Minicell



Metrocell



**Remote
RF**



**Single
Bay**

Capacity

- function of user channels per cell, which depends on many inter-related variables and some uncontrollable variables
 - ★ regulatory: allocated spectrum,
 - ★ operator: designed grade of service, coverage requirements, equipment choice, cell size
 - ★ manufacturer: access technique, coding technique,
 - ★ environment: user density
 - ★ very difficult to impartially compare between systems